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REDESCRIPTION OF THE NEPHTYID POLYCHAETE *AGLAOPHAMUS MINUSCULUS* HARTMAN, 1965

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Abstract.—The holotype of *Aglaophamus minusculus* has been redescribed to prevent the establishment of new species that will later have to be synonymized. Examination of the holotype has revealed discrepancies from the original description in two taxonomically important characteristics. The holotype has been found to have at least 12 pairs of interramal cirri rather than about six pairs as previously reported and only one kind of furcate setae, not two. The furcate setae with tines of distinctly unequal length, which were regarded as a second kind of furcate seta in the original description have been identified as damaged forms which originally had tines of almost equal length but one of which had broken near the base. The generic allocation of the present neotenic species in *Aglaophamus* is reviewed on the basis of findings on the morphology of juvenile nephtyids, and a description of the proboscis is provided, based on specimens from off Florida.

Aglaophamus minusculus, one of the smallest species of nephtyid polychaete so far reported, was originally described by Hartman (1965) as having about six pairs of interramal cirri and two kinds of furcate setae on both the notopodia and neuropodia among the postacicular fascicle of long and numerous setae. Dr. R. W. Virnstein and Ms. M. A. Capone of the Harbor Branch Foundation, Fort Pierce, Florida, collected approximately 1500 specimens of small nephtyid polychaetes from depths of about 200 m off Fort Pierce, on the east coast of Florida, from June 1978 to June 1979. Two hundred and thirty specimens from the Indian River Coastal Museum, Fort Pierce, were sent to the author for identification by Ms. Capone. Except for one *Nephtys* specimen, all of the specimens seemed to fit the description of *Aglaophamus minusculus* with the exception that they have 12–17 pairs of interramal cirri and only 'one kind' of furcate setae.

The holotype of *Aglaophamus minusculus,* collected from a depth of 200 m on the continental slope off New England, is deposited in the Allan Hancock Foundation, Los Angeles, California. This specimen was examined and found to have at least 12 pairs of interramal cirri and only 'one kind' of furcate setae. Since the distribution pattern of interramal cirri along the body and the setal types are important taxonomic characteristics of Nephtyidae, it is felt that a redescription of the holotype is necessary to prevent future descriptions of species that might eventually prove to be synonymous. There is no description of the proboscis in the original description; a description of the proboscis of the Florida specimens is provided here.

The following description is based on the holotype (AHF-Poly 0784). Although its proboscis is retracted, no dissection of the holotype for examination of the proboscis and parapodia was attempted to avoid further damage to the specimen since it is macerated and three parapodia are missing.

Aglaophamus minusculus Hartman, 1965
Fig. 1a–e

Description.—The holotype (AHF-Poly 0784), which is complete, is 4.0 mm long with 28 setigers. The body is broad for its length and 0.6 mm wide excluding setae at the eighth setiger, its broadest point. The proboscis is completely retracted and eyes are absent.

The prostomium is longer than wide, the anterior corner is nearly right-angled, with the front and sides almost straight. The first and second antennae are of equal length and tapering (Fig. 1a). They are close together on the anterior corner of the prostomium with the second pair on the ventral side slightly behind the first pair on the dorsal side (Fig. 1b). Each antenna is about half as long as the prostomium is wide.

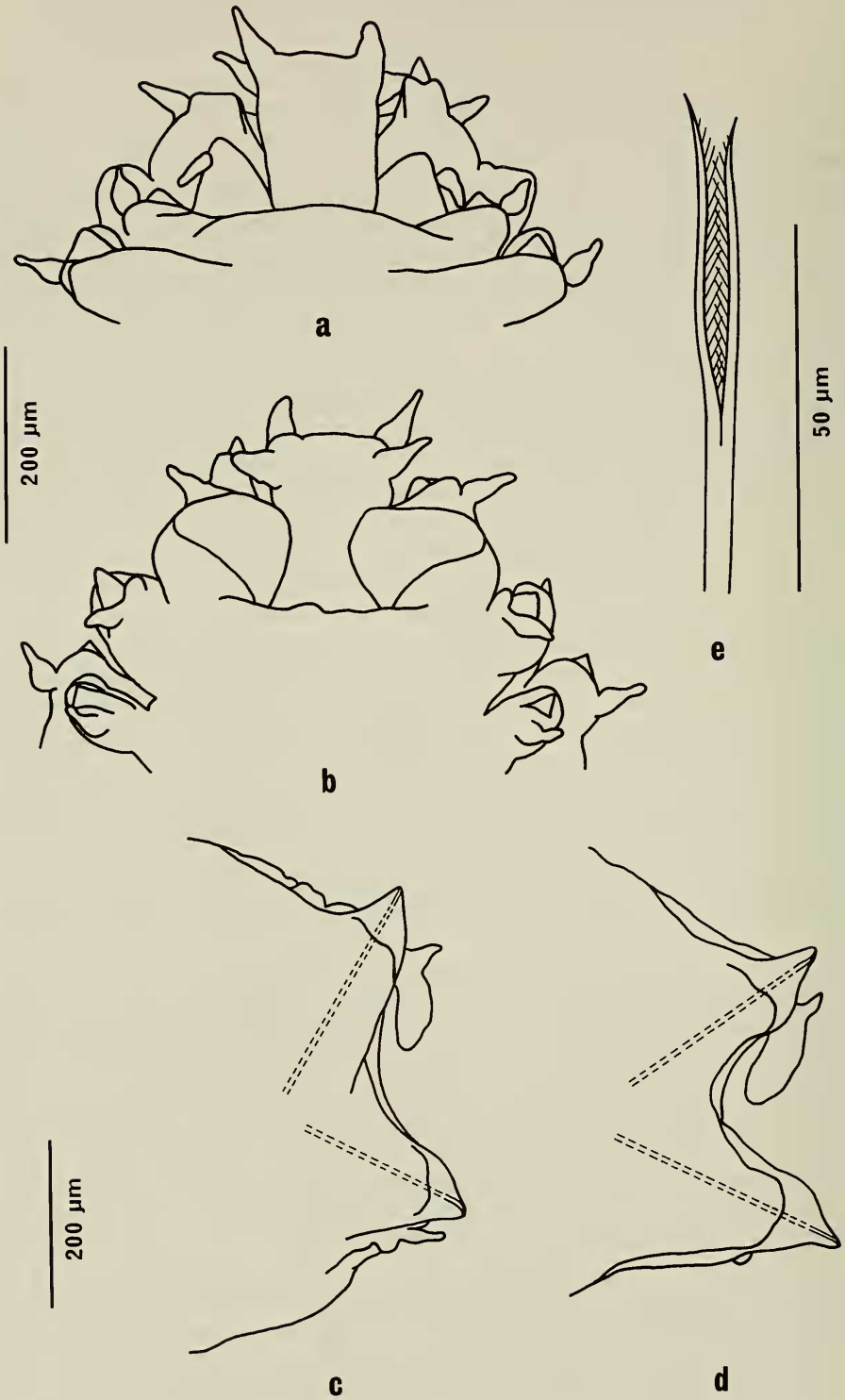
The first parapodium is reduced and directed forward (Fig. 1a). An acicular lobe supported by a curved-tipped aciculum is recognized in the first right neuropodium whereas it is missing in the left one. In the first neuropodium, only finely serrated capillary setae are present. A dorsal cirrus is present as a digitate or somewhat pyriform papilla arising backward from midway along the outer surface of the notopodium. The ventral cirrus is similar, but slightly longer than the dorsal one, arising anterolaterally from the outer surface of the neuropodium. The anterior edge of the second setiger on the ventral side forms the lower lip of the mouth, and the lateral lips are formed by the first setiger (Fig. 1b).

From the second setiger, parapodia are similar, and the preacicular and postacicular lobes are very small. The acicular lobes are much longer, nearly conical and very pointed, and are supported by acicula whose tips curve dorsad in the notopodia and ventrad in the neuropodia. The curved tips of the acicula are covered by a thin sheath. The dorsal cirri are tapered and in the anterior parapodia are pyriform, while in the middle and posterior parapodia they are often slightly constricted at the base. The ventral cirri are smaller and digitiform. Both dorsal and ventral cirri are present from the first to last (28th) setiger.

Possibly due to the age and small size of the specimen, most of the interramal cirri are macerated and the posterior interramal cirri are in especially bad condition.

Short and plump interramal cirri are present from the ninth setiger on the right side of the body, and at least from the tenth setiger on the left side (the ninth left parapodium is missing in the holotype). The interramal cirri are distinct and already almost fully developed in the ninth right and tenth left parapodia. The size of the interramal cirri increases slightly up to 13th to 14th setiger on both sides and then appears to decrease only slightly until the last few setigers. Even in the most developed interramal cirri, they are not developed enough to tell whether they are involute or recurved. They are short and almost straight.

On the right side, the interramal cirri are recognizable up to the 21st setiger, with the last two too macerated to tell whether they are reduced or broken off near the base. The interramal cirrus of the 19th right parapodium appears to be broken off at midlength. On the left side, interramal cirri are also recognized up to the 21st setiger, but the interramal cirrus of the 20th left parapodium is very small and that of the 21st left parapodium, even though distinct, is vestigial. This may be due to the macerated condition of these interramal cirri.


a
200 µm
b
e
50 µm
200 µm
c
d

The 29th segment, the pygidium, has no parapodium but acicula can be observed to project slightly over the epidermis of the pygidium and are covered by a thin sheath. One slender anal cirrus is present ventral to the anus.

Four types of setae are present in both the notopodia and neuropodia, 2 types in the preacicular fascicle and the other 2 in the postacicular fascicle. In the preacicular fascicle there are barred (laddered) setae and capillary setae showing very fine serration. The 2 types of setae are of about the same length. The majority of preacicular setae are barred, and a few capillary setae are present at the upper and lower end of the fascicle. The barred setae are thicker at the base than the capillary setae.

In the right notopodia, one capillary seta first appears at the upper end of the preacicular fascicle by at least the sixth setiger and at the lower end at the seventh setiger, and 1 to 3 (usually 2) capillary setae are present at each end of the fascicle except for the last 4 setigers in the case of the upper end and the last several setigers in the case of the lower end. In the left notopodia, capillary setae first appear at the seventh setiger, 1 at the upper end and 2 at the lower end. Posterior to the seventh setiger, 1 to 3 (usually 2) capillary setae are present at each end of the preacicular fascicle, except for the last 7 setigers in the case of the upper end and the last 6 setigers in the case of the lower end. In the right neuropodia, capillary setae are recognized at the upper end by at least the 13th setiger, and at the lower end 2 capillary setae first appear at the eighth setiger, and 1 to 2 setae are present at each end of the fascicle except for the last 8 setigers in the case of the upper end and the last 5 setigers in the case of the lower end. At the lower end of the right neuropodia, a maximum of 3 capillary setae are recognized. In the left neuropodia, capillary setae are recognized at the upper end by at least the 10th setiger and at the lower end one capillary seta first appears at the eighth setiger. Thereafter 1 to 2 setae, usually 2 at the lower end, are present at each end except for the last 8 setigers.

In the postacicular fascicle more numerous capillary setae of very fine serration and a few furcate (lyrate) setae are found. These capillary setae are slender and 1.5 to 2 times as long as the preacicular setae. Only one kind of furcate seta is present among the capillary setae, and they are longer than half the length of the preacicular barred setae, but less than the total length of the latter. These furcate setae have tines of slightly unequal length, and both tines are spinulose on the inner margins.

In the right notopodia, 1 furcate seta first appears in the fourth setiger and 2 to 4 (usually 3) furcate setae are present except in the case of the last 4 setigers. In the left notopodia, one furcate seta first appears at the fifth setiger and 2 to 4 furcate setae are present except in the case of the last 2 setigers. In the neuropodia, they first appear at the sixth setiger, 2 on the right neuropodium and one on the left. In the right neuropodia, 1 to 2 (usually 2) furcate setae are recognized except

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Fig. 1. *Aglaophamus minusculus*: a, Anterior end, dorsal view, proboscis completely retracted; b, Same, ventral view; c, Ninth left parapodium, anterior view; d, 16th left parapodium, anterior view; e, Furcate seta from 16th right parapodium (a, b, holotype (AHF-Poly 0784); c, d, from Florida (ORIUT-BEPL-M8407-1-1003); e, from Florida (ORIUT-BEPL-M8407-1-2011).

at the last setiger, but many of the setae observed on the neuropodia are broken. In the left neuropodia, 2 to 3 furcate setae are present except in the case of the last 3 setigers.

Remarks.—The furcate setae with two tines clearly of unequal length, only the longer one of which was spinulose on the inner margin, were regarded as a second sort of furcate seta in the original description (Hartman 1965; p. 90 and Pl. 13, fig. d). Such furcate setae are recognized in some parapodia of the holotype, but in this redescription, these setae are identified as broken forms which originally had tines of almost equal length (see discussion below).

Discussion

The original description refers to the presence of two kinds of furcate setae in each postacicular fascicle. This, however, is not the case in the holotype. Furcate setae with tines of distinctly unequal length are observed to be present in some parapodia, but they occur intermittently along the length of the body, whereas furcate setae with tines of almost equal length (Fig. 1e) are recognized in nearly all parapodia except for the first few anterior and last few posterior setigers. I mounted furcate setae from the Florida specimens on slides and under a compound microscope I broke them deliberately by pressing down on the coverglass. In many cases, the broken setae looked like those with tines of distinctly unequal length described by Hartman (1965). In the present paper, therefore, the former type of furcate setae are regarded as damaged forms that originally had tines of almost equal length but one of which had broken near the base. It is, however, not known whether this breakage occurred during life or only after the specimens were fixed. Whatever the case, it is not reasonable to include damaged forms in the description of setal types.

Nearly all of the Florida specimens have 27 to 30 setigers and are 4 to 5 mm long (the holotype has 28 setigers and is 4.0 mm long). In the holotype and the Florida specimens, interramal cirri first appear on the seventh to tenth setiger (ninth in the holotype) and they are present until the 20th to 24th setiger (21st in the holotype). Twelve to 17 pairs of interramal cirri are present (13 in the holotype), not about six pairs as stated in the original description.

While the interramal cirri of the holotype and the Florida specimens are observed to be short, plump and almost straight, the figure of the 16th parapodium in the original description (Pl. 13, fig. b) shows an interramal cirrus which apparently bends inward at midlength, and is not plump. Since the holotype has the 16th parapodia on both sides, it appears that the figure might not have been drawn from the holotype. As dissection of the holotype was not conducted, the ninth left and 16th left parapodia of one of the Florida specimens (ORIUT-BEPL-M8407-1-1003) which are identical with those of the holotype are shown in Fig. 1c, d.

The interramal cirri are not well enough developed to tell whether they are involute or recurved. The interramal cirri of juveniles of *Nephtys caeca* and *N. polybranchia* have a slightly involute appearance during the process of development to adult recurved interramal cirri (Ohwada, unpublished observation). In a neotenic species, therefore, a slightly involute appearance for the interramal cirri does not negate the choice of *Nephtys,* which has recurved interramal cirri, as the correct genus for the species (Ohwada 1985).

Contrary to Fauchald (1968, 1977) who described the tip of the aciculum in *Nephtys* as straight and blunt, curved acicular tips have been recognized in some *Nephtys* (Ohwada 1985). In *N. caeca,* acicula were observed to change from curved to blunt-tipped form as the juvenile grew (Ohwada 1983). With growth, the shaft of the aciculum thickened without thickening of the curved tip and, as a result, the curved tip became practically negligible in size compared to the thick straight shaft. Thus, the presence of curved acicular tips in a neotenic species does not exclude *Nephtys* as the correct genus for the species. In the present paper, the placement of the present neotenic species within *Aglaophamus* is determined rather by the presence of interramal cirri, furcate setae and the first pair of antennae. *Micronephtys* lacks interramal cirri (Fauchald 1968, 1977), *Nephtys* lacks furcate setae (Day 1967) and *Inermonephtys* lacks the first pair of antennae (Fauchald 1968).

No description of the proboscis is given in the original description, and in the present study dissection of the holotype was not attempted. In the Florida specimens with everted proboscises, the proboscis was observed to have 20 bifid subequal papillae and two simple ones in the terminal region surrounding a dorsoventral slit, 10 bifid papillae on each side and a single simple papilla in both the middorsal and midventral position. The subterminal papillae are arranged in 22 longitudinal rows consisting of several conical papillae that decrease in size toward the base of the proboscis. No middorsal unpaired subterminal papilla is present.

In the original description, Hartman (1965) considered the present species to have affinity with *Aglaophamus malmgreni* (Théel) on the basis of similarities in the morphology of the parapodium. In the present study, this view is supported by the similarities in morphology of the anterior end of the body between these two species (Fig. 1a; for *A. malmgreni* see Fauchald 1963, fig. 1, F) Ohwada (1985) suggests the possibility that the similarities in morphology of the prostomium and the first setiger may indicate systematic closeness.

Twenty-six of the Florida specimens (ORIUT-BEPL-M8407-1-1001–1004, 2001–2011, 6-4001–4007, 9001–9004) are preserved in the Ocean Research Institute, University of Tokyo.

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